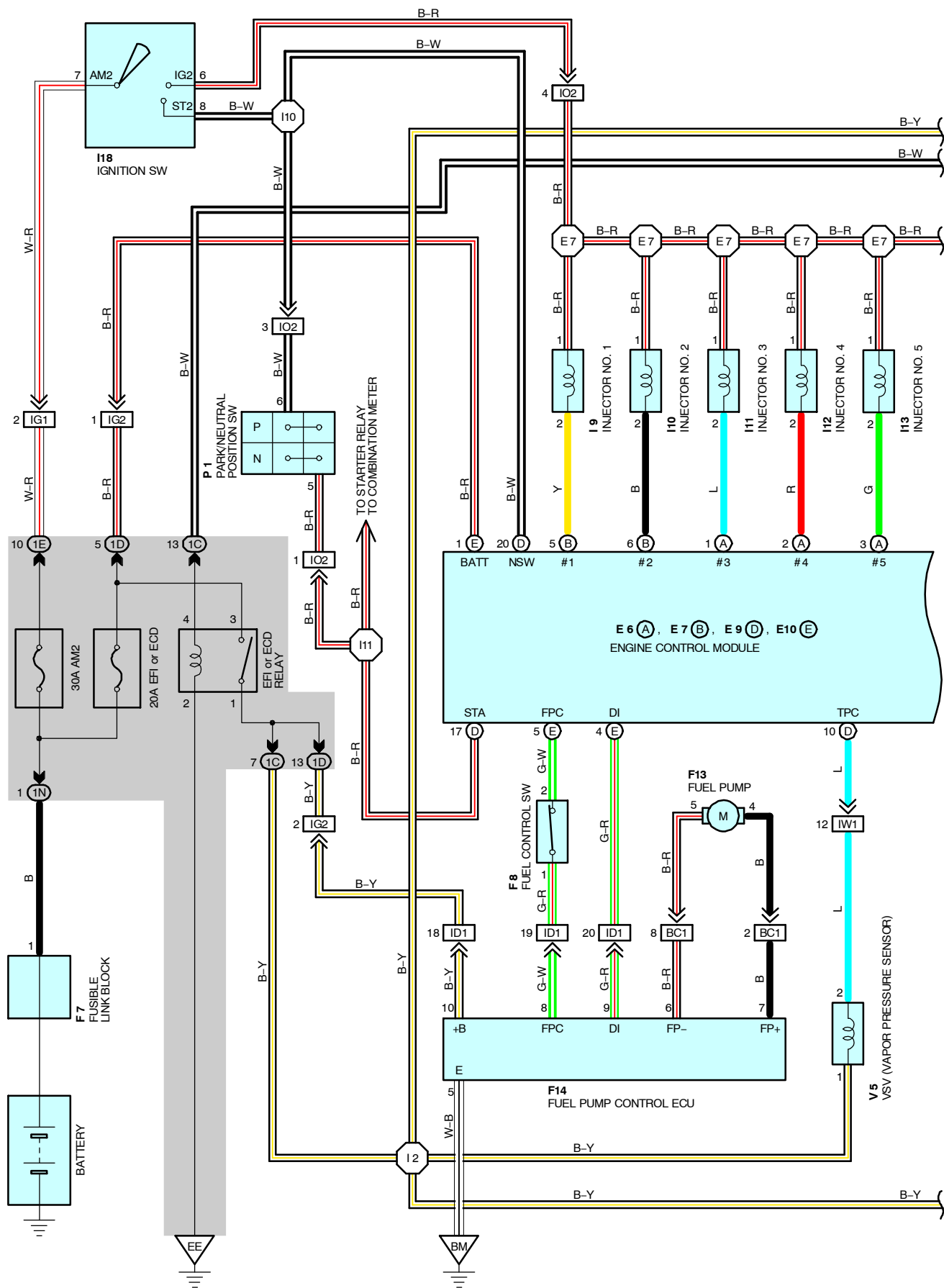
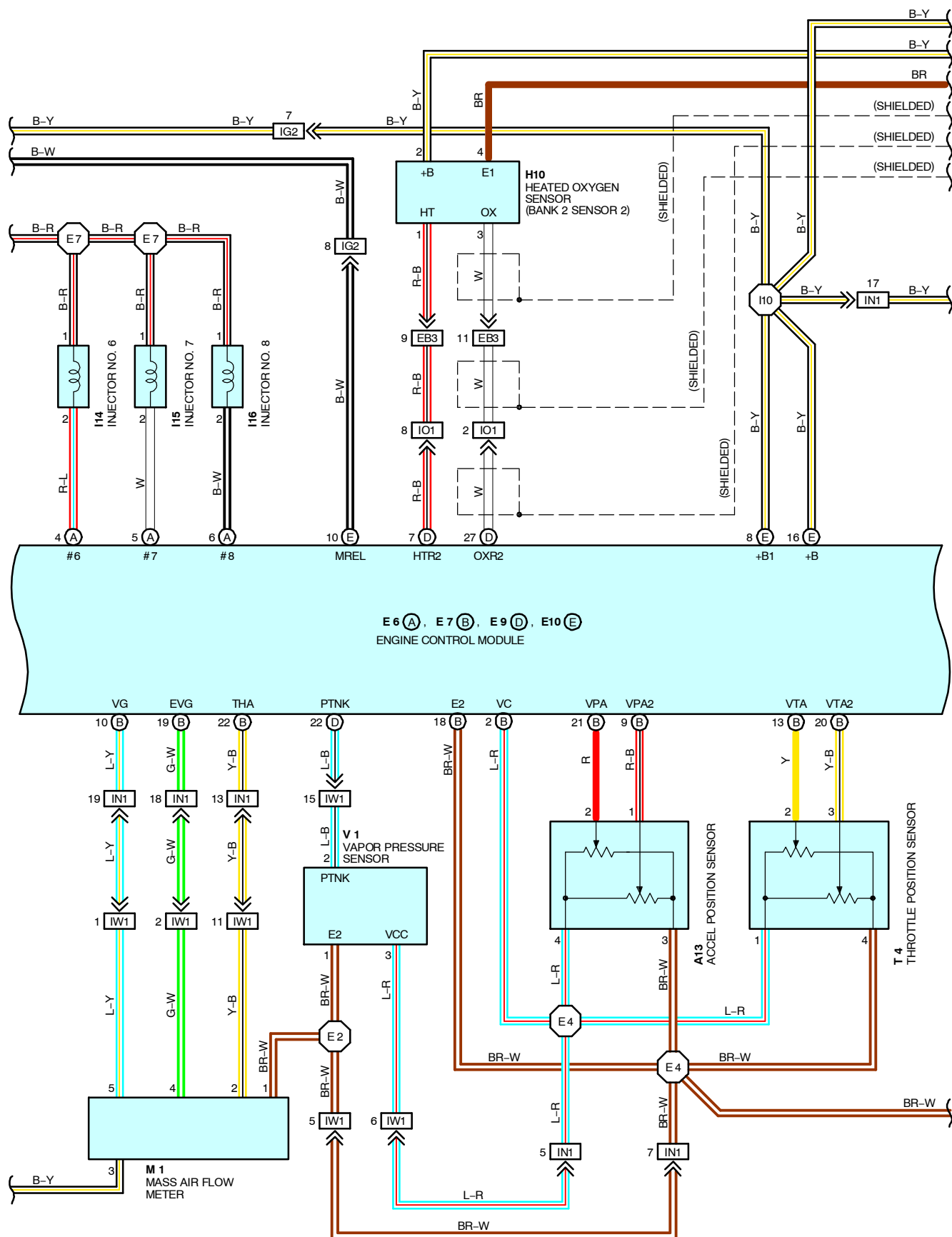
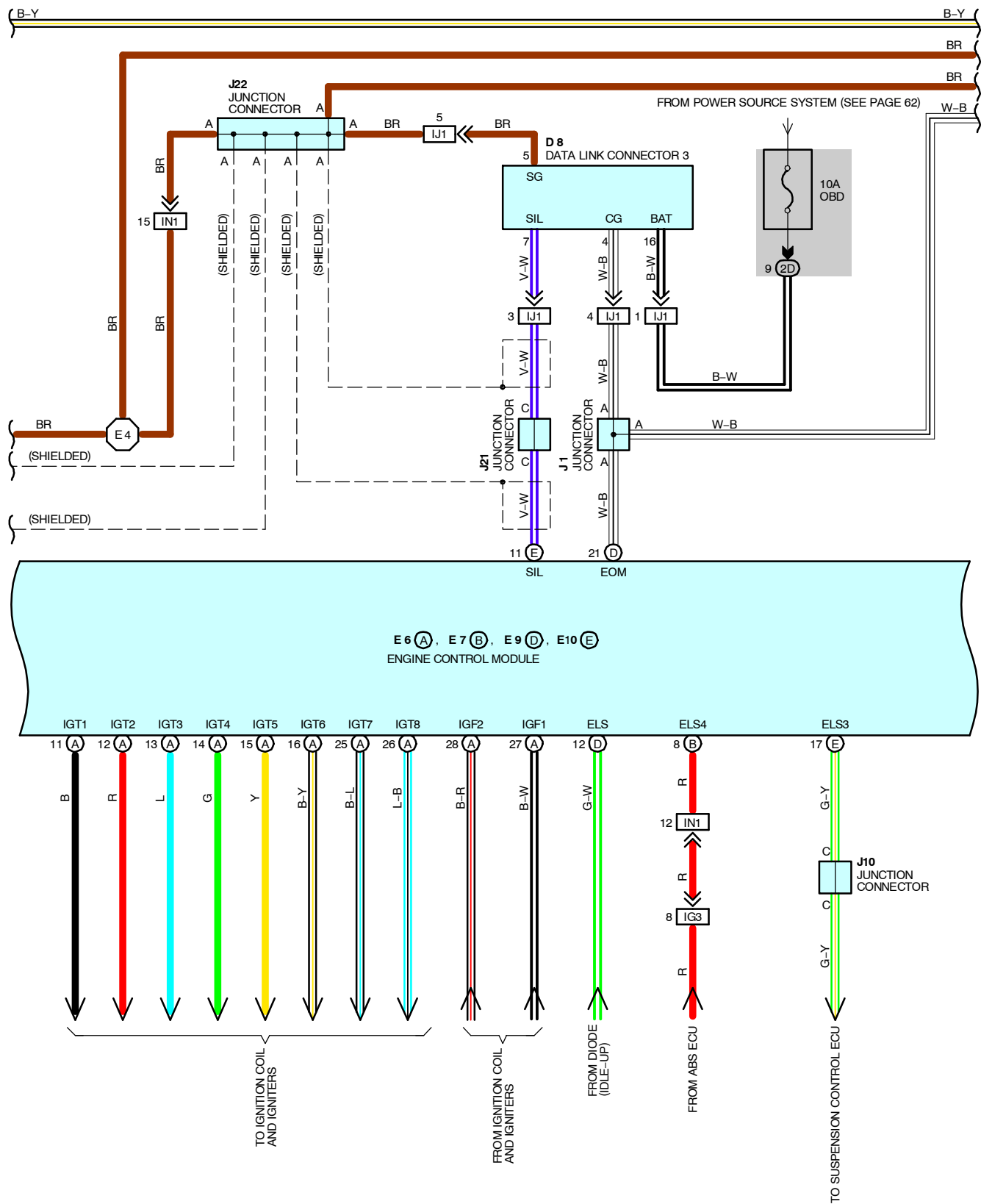


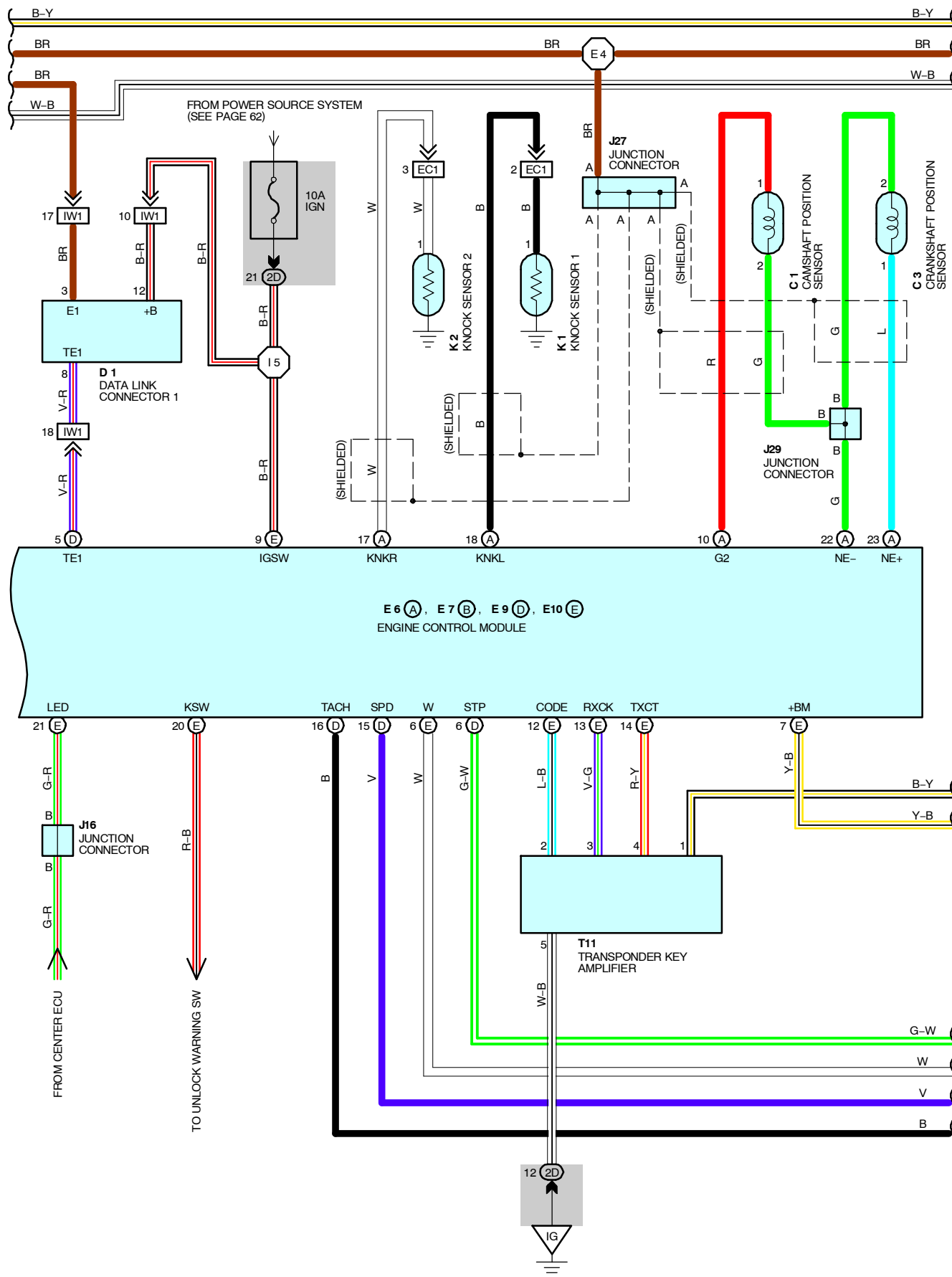
ENGINE CONTROL AND ENGINE IMMOBILISER SYSTEM







ENGINE CONTROL AND ENGINE IMMOBILISER SYSTEM





ENGINE CONTROL AND ENGINE IMMOBILISER SYSTEM

SYSTEM OUTLINE

The engine control system utilizes a microcomputer and maintains overall control of the engine, transmission etc. An outline of engine control is given here.

1. INPUT SIGNALS

(1) Engine coolant temp. signal system

The engine coolant temp. sensor detects the engine coolant temp. and has a built-in thermistor with a resistance which varies according to the engine coolant temp. The engine coolant temp. is input into **TERMINAL THW** of the engine control module as a control signal.

(2) Intake air temp. signal circuit

The intake air temp. sensor is installed in the mass air flow meter and detects the intake air temp., which is input as a control signal to **TERMINAL THA** of the engine control module

(3) Oxygen sensor signal circuit

The oxygen density in the exhaust emission is detected and is input as a control signal from the heated oxygen sensors to **TERMINAL OXL1, OXR1, OXL2, OXR2** of the engine control module.

(4) RPM signal circuit

The camshaft position is detected by the camshaft position sensor and is input into **TERMINAL G2** of the engine control module as a control signal. Also, the engine RPM is detected by the crankshaft position sensor and the signal is input into **TERMINAL NE+** of the engine control module.

(5) Throttle position sensor signal circuit

The throttle position sensor detects the throttle valve opening angle as a control signal, which is input into **TERMINAL VTA** of the engine control module.

(6) Vehicle speed circuit

The vehicle speed sensor (Combination meter) detects the vehicle speed, and the signal is input into **TERMINAL SPD** of the engine control module via the combination meter.

(7) Battery signal circuit

Voltage is constantly applied to **TERMINAL BATT** of the engine control module. When the ignition SW is turned on, the voltage for engine control module start up power supply is applied through the EFI or ECD relay, to **TERMINAL +B, +B1** of the engine control module. The current from **IGN** fuse flows to **TERMINAL IGSW** of the engine control module, and voltage is constantly applied to **TERMINAL +BM**.

(8) Intake air volume signal circuit

The intake air volume is detected by the mass air flow meter, and is input as a control signal to **TERMINAL VG** of the engine control module.

(9) Stop light SW signal circuit

The stop light SW is used to detect whether the vehicle is braking or not, and the signal is input into **TERMINAL STP** of the engine control module as a control signal.

(10) Starter signal circuit

To confirm whether the engine is cranking, the voltage applied to the starter motor when the engine is cranking is detected, and is input into **TERMINAL STA** of the engine control module as a control signal.

(11) Engine knock signal circuit

Engine knocking is detected by the knock sensors, and is input into **TERMINALS KNKL, KNKR** of the engine control module as a control signal.

2. CONTROL SYSTEM

- * SFI system

The SFI system monitors the engine condition through the signals input from each sensor to the engine control module. The control signal is sent to the engine control module **TERMINALS #1, #2, #3, #4, #5, #6, #7, #8** to operate the injector (Fuel injection). The SFI system controls the fuel injection by the engine control module in response to the driving conditions.

- * ESA system

The ESA system monitors the engine condition through the signals input from each sensor to the engine control module. The best ignition timing is decided according to this data and the data memorized in the engine control module. The control signal is output to **TERMINALS IGT1, IGT2, IGT3, IGT4, IGT5, IGT6, IGT7, IGT8** and these signals control the igniter to provide the best ignition timing.

- * Heated oxygen sensor heater control system

The heated oxygen sensor heater control system turns the heater on when the intake air volume is low (Temp. of exhaust emission is low), and warms up the heated oxygen sensors to improve their detection performance. The engine control module evaluates the signals from each sensor, and outputs current to **TERMINALS HTL, HTR, HTL2, HTR2** to control the heater.

- * Fuel pump control system

The engine control module supplies current to **TERMINAL FPC**, and controls the operation speed of the fuel pump with the fuel pump control ECU.

- * ACIS

The ACIS includes a valve in the bulkhead separating the surge tank into two parts. This valve is opened and closed in accordance with the driving conditions to control the intake manifold length in two stages, for increased engine output in all ranges from low to high speeds.

- * ETCS-i

The ETCS-i controls the engine output at its optimal level in accordance with the opening of the accelerator pedal, under all driving conditions.

3. DIAGNOSIS SYSTEM

When there is a malfunction in the engine control module system, the malfunctioning system is recorded in the memory. The malfunctioning system can be found by reading the code displayed on the malfunction indicator lamp.

4. FAIL-SAFE SYSTEM

When a malfunction has occurred in any system, there is a possibility of causing engine trouble due to continued control based on that system. In that case, the fail-safe system either controls the system using the data (Standard values) recorded in the engine control module memory, or else stops the engine.

ENGINE CONTROL AND ENGINE IMMOBILISER SYSTEM

SERVICE HINTS

EFI OR ECD RELAY

1-3 : Closed with ignition SW at **ON** or **ST** position and fuel control SW closed

E2 ENGINE COOLANT TEMP. SENSOR

1-2 : Approx. **16.2 kΩ** (**-20° C**, **-4° F**)

: Approx. **2.45 kΩ** (**20° C**, **68° F**)

: Approx. **0.32 kΩ** (**80° C**, **176° F**)

E7 (B0, E9 (D), E10 (E) ENGINE CONTROL MODULE

BATT-E1 : Always **9.0-14.0** volts

+BM-E1 : Always **9.0-14.0** volts

IGSW-E1 : **9.0-14.0** volts with ignition SW at **ON** or **ST** position

+B, +B1-E1 : **9.0-14.0** volts with ignition SW at **ON** or **ST** position

VC-E2 : **4.5-5.5** volts with ignition SW on

VTA2-E2 : **2.0-2.9** volts with ignition SW on and accelerator pedal released

: **4.6-5.1** volts with ignition SW on and accelerator pedal depressed

VTA-E2 : **0.4-1.0** volts with ignition SW on and accelerator pedal released

: **3.2-4.8** volts with ignition SW on and accelerator pedal depressed

VPA-E2 : **0.3-0.9** volts with ignition SW on and accelerator pedal released

: **3.2-4.8** volts with ignition SW on and accelerator pedal depressed

VPA2-E2 : **1.8-2.7** volts with ignition SW on and accelerator pedal released

: **4.7-5.0** volts with ignition SW on and accelerator pedal depressed

THA-E2 : **0.5-3.4** volts with idling, intake air temp. **20° C** (**68° F**)

THW-E2 : **0.2-1.0** volts with idling, engine coolant temp. **80° C** (**176° F**)

STA-E1 : **6.0** volts with ignition SW at **ST** position and shift lever in **P** or **N** position

TE1-E1 : **9.0-14.0** volts with ignition SW on

W-E1 : **9.0-14.0** volts with idling

: Below **3.0** volts with ignition SW on

○ : PARTS LOCATION

Code		See Page	Code		See Page	Code		See Page
A13		36	H8		37	J18		39
C1		36	H9		37	J21		39
C3		36	H10		37	J22		39
C8	A	38	I9		37	J27		39
C9	B	38	I10		37	J28		39
C14	A	38	I11		37	J29		39
C15	B	38	I12		37	K1		37
D1		36	I13		37	K2		37
D8		38	I14		37	M1		37
E2		36	I15		37	P1		37
E6	A	38	I16		37	S5		39
E7	B	38	I18		38	T3		37
E9	D	38	J1		39	T4		37
E10	E	38	J8		39	T11		39
F7		36	J10		39	V1		37
F8		38	J11		39	V2		37
F13		40	J14		39	V4		37
F14		40	J16		39	V5		37
H7		37	J17		39			

**: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR**

Code	See Page	Junction Block and Wire Harness (Connector Location)
1C	21	Engine Room No. 2 Wire and Engine Room J/B (Engine Compartment Left)
1D		
1E		
1N	21	Engine Room No. 3 Wire and Engine Room J/B (Engine Compartment Left)
2B	24	Dash Wire and Cowl Side J/B LH (Left Kick Panel)
2D		
2P	26	Instrument Panel Integration Wire and Cowl Side J/B LH (Left Kick Panel)

**: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS**

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EB1	44	Engine Wire and Transmission Wire (On the Transmission)
EB3		
EC1	44	Engine No. 2 Wire and Engine Wire (On the Transmission)
ID1	46	Dash Wire and Floor Wire (Left Kick Panel)
IG1	48	Engine Room No. 2 Wire and Dash Wire (Behind the Combination Meter)
IG2		
IG3		
IJ1	48	Dash Wire and Detector Wire (Instrument Panel Center)
IN1	50	Engine Wire and Dash Wire (Behind the Glove Box)
IO1		
IO2		
IU3	50	Instrument Panel Integration Wire and Dash Wire (Behind the Glove Box)
IW1	52	Engine Room No. 2 Wire and Dash Wire (Behind the Glove Box)
IX1	52	Instrument Panel Integration Wire and Engine Wire (Behind the Glove Box)
BC1	54	Floor Wire and Fuel Tank Wire (Near the Fuel Tank)

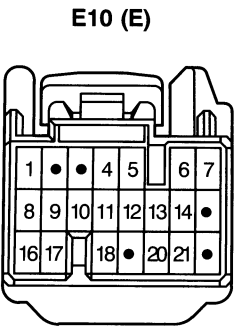
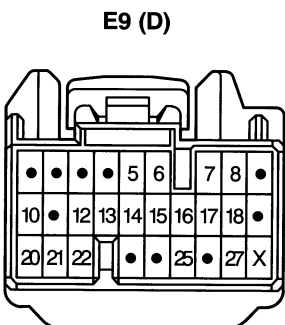
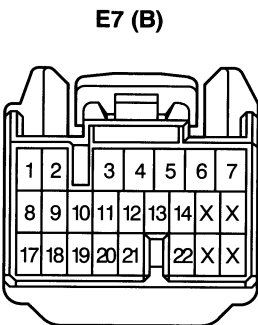
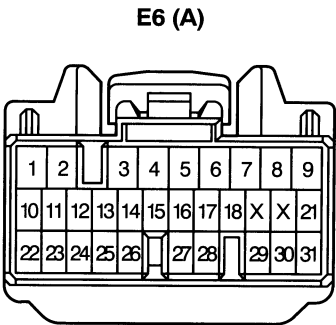
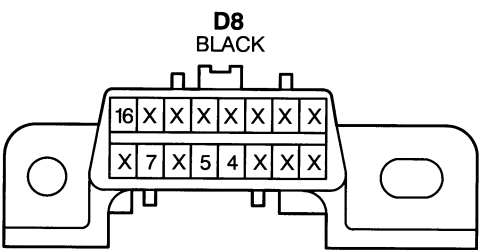
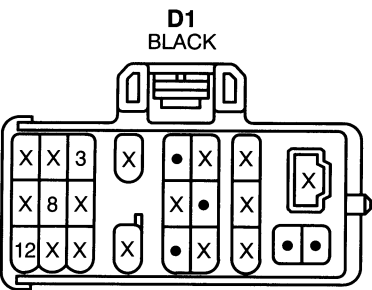
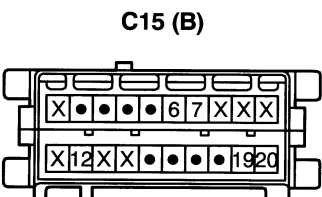
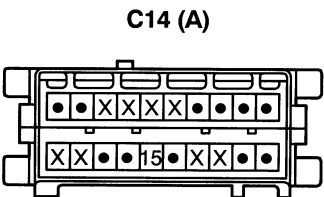
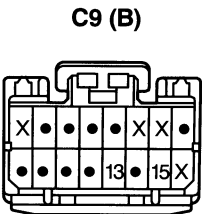
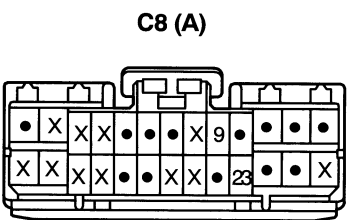
**: GROUND POINTS**

Code	See Page	Ground Points Location
EC	44	Rear Bank of Right Cylinder Head
EE	44	Front Left Side of Fender Apron
IF	46	Set Bolt of Cowl Side J/B LH
IG		
BM	54	Left Rear Side Quarter Panel

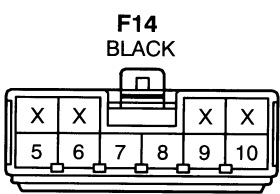
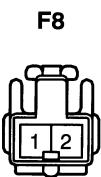
**: SPLICE POINTS**

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E2	44	Engine Room No. 2 Wire	I2	48	Engine Room No. 2 Wire
E4	44	Engine Wire	I5	48	Dash Wire
E5	44	Transmission Wire	I10		
E6			I11		
E7	44	Engine Wire			

ENGINE CONTROL AND ENGINE IMMOBILISER SYSTEM



F7
(See Page 34)



H7
DARK GRAY



H8
DARK GRAY



H9
DARK GRAY



H10
DARK GRAY



I9, I10
BLUE



I11, I12
BLUE



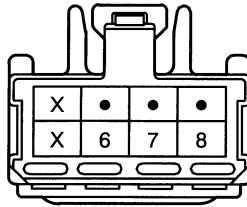
I13, I14
BLUE



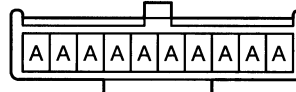
I15, I16
BLUE



I18

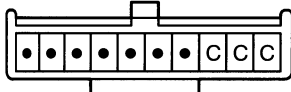


J1



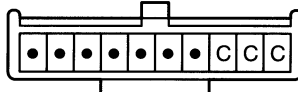
(Hint : See Page 7)

J8
BLUE



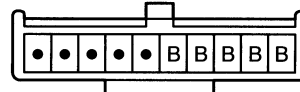
(Hint : See Page 7)

J10
BLUE



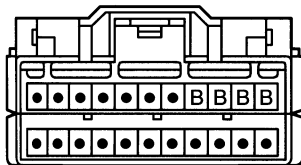
(Hint : See Page 7)

J11
GREEN



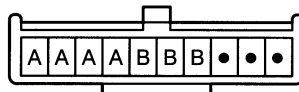
(Hint : See Page 7)

J14



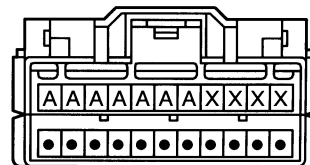
(Hint : See Page 7)

J16
BLUE



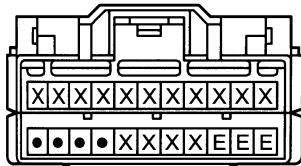
(Hint : See Page 7)

J17



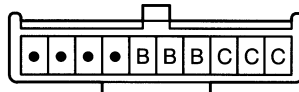
(Hint : See Page 7)

J18
GRAY



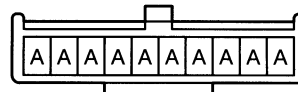
(Hint : See Page 7)

J21
BLUE



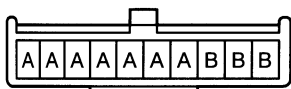
(Hint : See Page 7)

J22



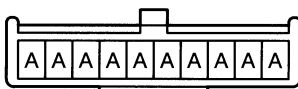
(Hint : See Page 7)

J27



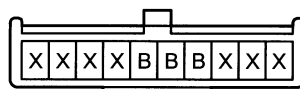
(Hint : See Page 7)

J28



(Hint : See Page 7)

J29
BLUE



(Hint : See Page 7)

K1, K2
DARK GRAY



ENGINE CONTROL AND ENGINE IMMOBILISER SYSTEM

